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Guidance

Electric and magnetic fields: health effects of exposure

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Scientific studies suggest that electric and magnetic fields are unlikely to be harmful at the levels normally found in homes, although there is some uncertainty regarding certain health effects. See the report [Advice on limiting exposure to electromagnetic fields](http://webarchive.nationalarchives.gov.uk/20140629102627/http://www.hpa.org.uk/Publications/Radiation/NPRBArchive/DocumentsOfTheNRPB/Absd1502/)

(<http://webarchive.nationalarchives.gov.uk/20140629102627/http://www.hpa.org.uk/Publications/Radiation/NPRBArchive/DocumentsOfTheNRPB/Absd1502/>).

The following frequently asked questions explain the main health effects of electric and magnetic fields.

1. What are the known effects of exposure to electric and magnetic fields?

Power frequency electric and magnetic fields cause electrical currents inside the body. The magnetic fields can cause faint flickering visual sensations (called phosphenes) or even stimulate nerves and muscles, although these effects occur at levels many thousands of times higher than those encountered in buildings.

Electric fields also produce electric charges on the surface of the body. Some people notice the strong electric fields found outdoors beneath large power lines, through hair standing on end. Under some circumstances, people can experience microshocks, like a static shock, coming from contact with objects in strong electric fields. These effects only occur at field levels much higher than those encountered in homes.

Electric fields can cause charges on the body underneath a power line.

2. Is there any long term health risk associated with exposure to electric and magnetic fields?

A lot of research has been carried out into the possibility that electric or magnetic fields cause cancer or other serious illnesses.

2.1 Studies on electric fields

Studies investigating the effects of electric fields have suggested that small charged particles, known as corona ions, which are generated by power lines, may cause health effects. However, there is little evidence to support this possibility.

2.2 Studies on magnetic fields

The results of some studies of human populations have suggested that there may be an increase in risk of childhood leukaemia at higher than usual magnetic field exposures in homes, some of which are near to large power lines. Studies have also looked at whether exposure is linked to the risk of other illnesses such as Alzheimer's disease. Although there have been some results suggesting a link, the overall balance of evidence is towards no effect and much weaker than that for childhood leukaemia.

The types of studies that investigate these risks face many difficulties, including the possibility of chance, bias and the presence of confounding factors that may confuse the findings. Importantly there is no known mechanism or clear experimental evidence to explain how these effects might happen.

3. Do magnetic fields cause childhood leukaemia?

3.1 Evidence for

There are a number of studies showing a possible link between exposure to magnetic fields in the home (and/or living close to high voltage power lines) and a small excess of childhood leukaemia.

It is estimated that 2 to 5 cases from the total of around 500 cases of childhood leukaemia per year in the UK could be attributable to magnetic fields.

This number is based on the assumption that exposure has to be above a certain threshold before there could be a health effect. The overall evidence, however, is not strong enough to draw a firm conclusion that magnetic fields cause childhood leukaemia.

3.2 Evidence against

Magnetic fields don't have sufficient energy to damage cells and thereby cause cancer.

At present there is no clear biological explanation for the possible increase in childhood leukaemia from exposure to magnetic fields.

The evidence that exposure to magnetic fields causes any other type of illness in children or adults is far weaker.

3.3 Extract from HPA (NRPB 2004) advice:

"...the overall evidence for adverse effects of EMFs on health at levels of exposure normally experienced by the general public is weak. The least weak evidence is for the exposure of children to power frequency magnetic fields and childhood leukaemia."

4. How does the childhood leukaemia risk compare with other risks in the environment?

If magnetic fields cause childhood leukaemia, the evidence suggests that this would explain 2 to 5 of the 500 cases that occur each year in the UK. To put this in context, about 140 children are killed each year in the UK due to traffic accidents and there are an estimated 2,700 deaths in the general population due to passive smoking.